THE GEOLOGY OF THE PONTVILLE-DROMEDARY AREA, TASMANIA

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(With 1 Plate, 2 Figures and 2 Maps)

ABSTRACT

More than 1,500 feet of flatly-dipping Permian mudstones, sandstones and limestones have been divided into nine units, and are overlain with probable disconformity by 1000 + feet of Triassic sandstone and shale, the former rock type being dominant. Jurassic (?) dolerite intrudes the Permian and Triassic sediments in the form of dykes, gently transgressive sheets and sills. The distribution of the various rock types, along with the strong Tertiary tensional faulting, has controlled the structure of the area and hence the development of the present-day topography. A flow of olivine basalt, about 200 feet thick, partly filled the valleys of the Jordan River and its tributaries, probably in late Tertiary times.

INTRODUCTION

The area mapped consists of two ten-kiloyard squares, 5074 and 5174, the Dromedary and Pontville squares respectively, which are part of the Brighton one mile (Army) map sheet. The area is situated between twelve and twenty miles north of Hobart on the main Hobart-Launceston Highway. Mapping was carried out in the field by walking the outcrop or contact and pinpointing it on aerial photographs. A base map was constructed by means of a slotted template laydown on a grid to the scale of four inches to the mile, using trigonometrical stations to provide the horizontal control. The topographical detail and the geology were then transferred directly from the aerial photographs by means of a rectiplanograph. All grid references within the text are given in the normal manner as used by the Army. Specimens referred to in this paper are in the collection of the Geology Department, the University of Tasmania, and the specimen numbers quoted are the catalogue numbers in that collection.

PREVIOUS LITERATURE

Johnston (1888) makes reference to the Dromedary Permian rocks but no detailed work was recorded by him. However, Nye (1922) mapped the area in a broad regional survey, and Lewis (1946) has also covered part of the Pontville square in a similar manner.

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PHYSIOGRAPHY

The major controlling factor of the physiography of the area has been the Tertiary faulting, and the distribution of the rock types has played a secondary, but still important, role.

The greater part of the area consists of rounded, but commonly steep-sided, hills rising up to 800 feet above the relatively broad open valleys. In the main the hills are of dolerite and the valleys are eroded in softer Triassic sediments.

The faults in general strike in a north-westerly direction and downthrow to the north-east, and it is within the resulting downthrown blocks that the main drainage takes place in a direction approximately parallel to the fault trend. The block on the downthrown side of the Dromedary Fault appears to have been tilted in towards the fault so that a distinct trough was formed in front of the fault scarp along which the River Jordan flows. Numerous south or south-west flowing consequent streams have developed on the slopes of the tilted block together with north-east flowing streams from the upthrown rock. The course of the Bagdad Rivulet may be similarly controlled.

The upthrown side of the north-west trending Dromedary Fault may be considered as a physiographic unit. It rises from an altitude of 700 feet to 1000 feet at the fault to a height of 3245 feet at Mt. Dromedary in the extreme south-west corner of the area. For a half to one mile south-west of the fault the altitude of the country remains similar to that of the downthrown block but then rises by a series of cliffs and steep slopes to Mr. Dromedary, so that there has been a scarp retreat of about one mile from the fault. Mt. Dromedary is capped by about 1000 feet of dolerite which tends to resist erosion, thus maintaining the relief; however, dolerite and Triassic sediments have been removed east of Mt. Dromedary, revealing the Permian rocks which make up the bulk of the Dromedary block.

Scree slopes, composed mainly of dolerite, are very common between 2800 feet and 2000 feet on the slopes of Mt. Dromedary, but only rarely extend to lower levels. However, at 012428 a tongue of scree material about 200 yards across is found at the stratigraphic level of the Risdon Sandstone at an altitude of 1400 feet. What is probably a

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remnant of much older scree material occurs at 027406 in a road cutting near the Upper Dromedary village. It consists of angular blocks of fossiliferous Permian sediments, Triassic sandstones and fresh dolerite with a matrix of finer material of the same composition. The locality lies between the retreated fault scarp and the fault plane, but the position of the material is not consistent with the present-day scarp. However, the material could have been a scree related to an earlier position of the fault scarp.

A distinct, but usually not well developed, bench has formed at the top of the Ferntree Mudstone as a result of its relative resistance to erosion as compared with the overlying Triassic sandstones. At the stratigraphic level of the Rayner Sandstone a similar bench tends to be present.

North and north-east of the Dromedary block the Jordan River flows in a generally south-east direction, roughly parallel to the Dromedary Fault, which has controlled its course. The Jordan River in pre-basaltic times continued in a south-easterly direction as far as Brighton where it turned south to meet the River Derwent. However, owing to basalt filling its valley at least as far west as 087434, the river was displaced northwards so that from near the junction of the Lower Dromedary and Broadmarsh roads it now flows for one and a half miles in a north-easterly direction and then east to Pontville, where it now turns south. For a large part of its course in this portion of the area the Jordan flows in Triassic rocks where it has commonly developed quite extensive terraces.

Soon after the Jordan River enters the north-west corner of the Dromedary square it traverses dolerite in which it has cut a rather steep-sided, V-shaped and gorge-like valley, 500 feet in depth. However, south-west of Strathallie Hill there is a broad open valley in Triassic sediments which extends from Broadmarsh south-east to meet the Jordan valley again near the Broadmarsh-Upper Dromedary turnoff. The reason the Jordan preferred to make its own course in the dolerite, rather than in the softer Triassic sandstones is probably that the drainage pattern is superimposed, since it is thought that the dolerite of Strathallie Hill extended across the broad valley south-west of it to join up with that at 008460. Just east of Broadmarsh the river, in its gorge-like valley, takes a semi-circular course in the dolerite for one and a half miles and then turns south to flow in Triassic sandstones again. On the aerial photographs the river is seen to follow a concentric pattern of joints which formed during the cooling of the dolerite. The course of the river appears to be controlled by these weaknesses within the dolerite, while the dolerite which covered what is now the broad valley to the south-west was eroded off by small creeks. Once the dolerite was removed, erosion proceeded at a faster rate owing to the less cohesive nature of the Triassic rocks, producing the relatively broad valley.

After leaving the gorge north of Strathallie Hill, the River Jordan remains in Triassic sediments to a little south of Pontville where it cuts into basalt which acts as a local base level for the river above it. The stream has cut a steep-sided gorge up to 150 feet deep in the basalt and it remains in this rock type practically all the way to its confluence with the River Derwent. Just south of Brighton the river leaves both the basalt and dolerite and flows in Triassic sandstones and shales, but it soon turns west to run again into basalt. At 120408 the Jordan swings sharply west, then south and then north-east, practically doubling back on itself. After a further swing to the south-east into dolerite the Jordan reaches its estuary about 1000 yards south of the boundary of the Pontville square.

Terraces are commonly developed in the valleys of the major streams of the area, particularly where these streams have Triassic sediments as bed rock. The streams are now almost invariably incised into their terraces although restricted areas of flood plain, which are related to the present river levels, do occur. Several sets of terraces can be recognised. Generally a well-preserved terrace occurs from 5 to 14 feet above the present river levels, while a second slightly dissected terrace is commonly found at the 20 to 40 feet level. This terrace in the Jordan River Valley appears to be degradational, whereas those occurring in the Strathallern and Bagdad Rivulet valleys are covered with alluvium. The latter is well above the level of the basalt and is probably of pre-basaltic age. A possible high level dissected terrace, rising from 40 to 120 feet eastwards, is present east of the Bagdad Rivulet and also appears to be pre-basaltic in age. Since in all cases the terraces are developed behind much more resistant rocks which have acted as local base levels, the rejuvenation indicated by the incised streams cannot be due to eustatic changes in sealevel. This rejuvenation may be caused by climatic factors, e.g., an increase in rainfall resulting in a greater run-off and hence more active stream action. This would have been aided in historical times by the clearing of the land for agricultural purposes which has allowed a faster and greater run-off.

STRATIGRAPHY

A summary of the stratigraphy of the area is set out below:—

- Quaternary System: Alluvium and river gravels.
- Tertiary System: Mangalore clay deposit; basalt.
- Jurassic System: Dolerite.
- Triassic System: Granule conglomerates, sandstones and shales; thickness 1000 + feet.
- Permian System: Sandstones, mudstones, limestones; thickness 1530 + feet.

PERMIAN SYSTEM

The Permian System, as developed in this area, consists of 1530 feet of sandstones, mudstones, calcareous siltstones and limestones which can be divided into nine stratigraphic units. These have been defined and described in detail by Banks and Hale (1957), immediately to the south of the area, at Mt. Nassau.

	Thickness (feet)
Ferntree Mudstone	620
Risdon Sandstone	20
"Woodbridge Glacial Formation"	260
Cascades Group—	
Grange Mudstone	0-100
Berriedale Limestone	250
Nassau Siltstone	60
Rayner Sandstone	35
Faulkner Group	40
Bundella Mudstone	250

Their age varies from Lower Artinskian to Kungurian (Banks and Hale, 1957).

Bundella Mudstone

The Bundella Mudstone consists of a series of sandstones, siltstones, mudstones and calcareous mudstones totalling about 250 feet in thickness. Thus some 110 feet more of this formation is exposed in this area than in the type section for the Permian in the Hobart area (Banks and Hale, 1957). The section is very similar in all respects to the type section; there is an upper unfossiliferous member followed downwards by richly fossiliferous beds together totalling some 175 feet. Below this occurs about 40 feet of calcareous mudstone, well exposed at 034402, because of it being hardened by thermal metamorphism caused by an intrusion of dolerite immediately below it. The calcareous nature of the mudstone is due entirely to the fossil content which is of the order of 15 to 20 per cent of the rock. In thin section (8323) the rock is found to be a very poorly sorted mudstone containing about 30% of angular, clear, quartz which ranges in size from 0.8 mm. down to 0.004 mm. or less with an average of about 0.025 mm. The quartz fragments are set in an extremely fine-grained colourless matrix, probably consisting of a mixture of clay minerals and finely divided quartz. Areas of calcite up to 0.5 mm. in length are recrystallized fossils and constitute some 10% of the rock. The mudstone is very fossiliferous containing genera which occur in the upper parts of the formation, such as *Stenopora, Strophalosia*, aviculopectenids, spiriferids, fenestellids, *Keeneia platyschismoides* and *Eurydesma*. The lowest exposed unit of the Bundella Mudstone is a massive buff-coloured mudstone about 40 feet in thickness and contains abundant spiriferids and some *Stenopora*.

Faulkner Group

This group consists of about 40 feet of quartz sandstones and siltstones which conformably overlie the Bundella Mudstone and underlie conformably the Rayner Sandstone. Banks and Hale (1957) have defined the Faulkner Group but in this paper, partly due to difficulties in field mapping, the two upper formations, the Fergusson Siltstone and the Altamont Conglomerate, have been included with the overlying Rayner Sandstone.

The thickness of this modified Faulkner Group given by Banks and Hale is 84 feet, which is more than double the thickness recorded in this area. The base of the Faulkner Group is a bed about four feet thick of fine-grained poorly-sorted grey sandstone containing plates of golden mica and abundant black carbonaceous remains. It is composed mainly of quartz with some feldspar. This bed is probably equivalent to the lower part of the Rathbones Sandstone and Siltstone, the Geiss Conglomerate apparently being absent. The rest of the Faulkner Group here consists of grey fissile siltstone and well-sorted massive to flaggy quartz sandstones commonly with much muscovite on the bedding planes. The only member of this group which crops out over any distance is the eight feet thick bed of sandstone, towards the base, which can be correlated with the upper part of the Rathbones Sandstone and Siltstone. The beds above are to be correlated with the Byers Sandstone, Jarvis Siltsone, and the Parramore Sandstone and Siltstone as defined by Banks and Hale.

Rayner Sandstone

The Rayner Sandstone (including the Altamont Conglomerate and Fergusson Siltstone of Banks and Hale) is about 35 feet thick and consists of siltstone and sub-greywacke sandstone. It overlies the Faulkner Group conformably and is in turn overlain by the Nassau Siltstone. At the base occurs a medium-grained yellow sub-greywacke sandstone, which can be correlated with the Altamont Conglomerate because of the numerous sub-rounded erratics present. Its thickness is probably only a few feet. Following this bed is about 20 feet of grey, even-grained, laminated, siltstone, the equivalent of the Fergusson Siltstone. Approximately the upper ten feet of this formation is the Rayner Sandstone *sensu stricto*—a coarse sub-greywacke sandstone containing abundant sub-rounded erratics of low sphericity, composed mainly of vein quartz. The rock is massive, poorly sorted and consists of angular particles of quartz with appreciable amounts of feldspar and small rock fragments. Several spiriferids were observed in the sandstone.

Cascades Group

This group consists of three formations: the Nassau Siltstone, the Berriedale Limestone and the Grange Mudstone, and conformably overlies the Rayner Sandstone and is overlain by the "Woodbridge Glacial Formation". The total thickness is of the order of 310 feet. The Nassau Siltstone was mapped as a separate unit but in most cases it was found impossible to differentiate the upper two formations owing to the lack of outcrop and facies changes from mudstone to limestone.

Nassau Siltstone

The Nassau Siltstone consists of about 60 feet of grey siltstone which becomes quite calcareous towards the top; the boundary between it and the Berriedale Limestone is gradational. The formation in this area is very similar to its equivalent at Mt. Nassau except that the proportion of limestone occurring appears to be much lower in the former. The Nassau Siltstone is composed of a series of alternating massive and fissile siltstones which, when fresh, are grey in colour, weathering to yellow. The basal five feet contains no fossils and but few erratics; however, above this horizon the proportion of fossils steadily increases, the most abundant fossil being *Strophalosia jukesi*, in addition to spiriferids, ramose *Stenopora*, fenestellids, and some pelecypods and gastropods. Erratics occur throughout the formation but are not abundant.

Berriedale Limestone

The Berriedale Limestone is a massive, dark-grey, dense limestone with beds two to four feet in thickness and two to nine inch beds of laminated calcareous mudstones between them. It is up to about 250 feet thick in this area in contrast to a thickness of some 150 feet given by Banks and Hale for the Mt. Nassau section. As at Mt. Nassau the limestone is very fossiliferous, the most common types being fenestellids, spiriferids, *Stenopora*, both lamellar and ramose varieties and *Strophalosia*. Erratics are present but do not occur abundantly.

Grange Mudstone

This formation is not always present but may be up to 100 feet thick; it is a facies variant of the Berriedale Limestone. Below the " Woodbridge Glacial Formation " at 027419 no Grange Mudstone is present; limestone occurs right up to the basal sandstone of the " Woodbridge Glacial Formation ". However, at 006447 about 100 feet of Grange Mudstone is present and a similar thickness occurs at 075400. The Grange Mudstone is a massive buff coloured mudstone containing abundant fossils, including *Strophalosia typica* and very common fenestellids and *Stenopora*. As in the other formations of this group erratics occur but are not common. Banks and Hale report a thickness of about 100 feet for the Grange Mudstone in the Mt. Nassau section which is comparable to the thickness in the Dromedary area but, as pointed out above, in at least one locality no Grange Mudstone occurs.

" Woodbridge Glacial Formation "

Conformably overlying the Cascades Group and overlain conformably by the Risdon Sandstone is the " Woodbridge Glacial Formation ", a formation of siltstones and sandstones about 260 feet thick. The section is in all respects quite similar to that at Mt. Nassau, where it is approximately 275 feet thick. The formation is only fossiliferous in the upper 60 feet and the basal 25 feet. The basal member is a coarse-grained sandstone about four feet thick which varies from a reasonably well sorted sandstone at 027419 to a poorly sorted sandstone at 076401, where it contains abundant quartz fragments up to 10 mm. in size in addition to slate fragments. *Strophalosia typica*, as well as other fossils occur in this bed. Above the sandstone there is about 50 feet of alternating sandstone and fissile siltstone; the lower beds of the latter being fossiliferous. The next 140 feet consists of unfossiliferous fissile and massive siltstones and fine sandstones.

The uppermost 60 feet of this formation are siltstones and fine sandstones abounding in fossils, particularly *Strophalosia ovalis*, long-hinged spiriferids and fenestellids. Pelecypods are also common, especially in horizons 20 to 30 feet below the Risdon Sandstone. In a well-exposed section, immediately below the Risdon Sandstone at 067405, an extremely rich fauna was found consisting of abundant *Terrakea* c.f. *solida* and *Strophalosia ovalis*, as well as many other species. Bands in the upper three feet six inches are so fossiliferous as to be called limestones. Erratics are not common through the formation, but locally may be abundant.

Risdon Sandstone

Conformably overlying the " Woodbridge Glacial Formation " and below the Ferntree Mudstone is the Risdon Sandstone, which is about 20 feet thick. Invariably this formation is well exposed, but at only one locality (067405) is the outcrop good enough to obtain a complete section.

The basal member, 6 inches thick, is a conglomerate with a matrix of sand-size particles. The pebbles are composed almost entirely of quartzite and vein quartz and are up to one foot in diameter. Several spiriferids were seen in this bed. Above this occurs five feet of yellow, medium-grained, moderately well sorted, massive quartz sandstone with some feldspar. Towards its base there are some spiriferids present and erratics are by no means rare. A three inch band of iron-stained conglomerate, consisting mainly of sub-rounded pebbles up to six inches in diameter, of quartz and quartzite, occurs above the sandstone. However, many of the pebbles are strongly angular. Some thin, flat, angular mudstone pebbles occur, indicating that water transport was at a minimum. The medium-grained sandy matrix is mainly quartz. The upper 13 feet of this formation consists of a massive, yellow, medium-grained quartz sandstone, showing no bedding (Plate 1, fig. 1). Feldspar, in addition to graphite and muscovite mica are also usually present. The sorting is fair, with fragments of quartz up to 5 mm. in size not uncommon, and there is an occasional small erratic, here and there, through the bed. The total thickness of the formation exposed at this locality is 18 feet 6 inches. Ferntree Mudstone occurs nearby, immediately above the sandstone, but in this section the Ferntree has been removed by erosion. Therefore the thickness of the Risdon Sandstone could be greater than given here, but by no more than a foot or so.

Ferntree Mudstone

The Ferntree Mudstone, conformably overlying the Risdon Sandstone, consists of a series of mottled grey mudstones with subordinate fissile mudstones. It is about 620 feet thick which is very similar to the thickness at Mt. Nassau. On weathering, the rocks assume a yellow colour. In the Mt. Dromedary block the formation commonly has a cliffy outcrop. Erratics are rare, although locally they may be common, but small rock fragments are invariably present in small proportion. Fossils are rare in the Ferntree Mudstone but several spiriferids were observed. Small scale slump structures are not uncommon. In other areas near Hobart a formation of Permian age, the Cygnet Coal Measures, occurs immediately above the Ferntree Mudstone, but if it was deposited in the Dromedary area it must have been removed by erosion before the deposition of the basal Triassic grits.

TRIASSIC SYSTEM

Overlying the Permian System, probably disconformably, occurs a series of sandstones, mudstones and shales with subordinate conglomerates, which from plant remains found in similar beds elsewhere in Tasmania are considered to be Triassic in age (Banks, 1952) and deposited in a terrestrial environment. All the rocks of the Triassic System have been mapped as one unit—the Knocklofty Formation. Two distinct rock associations can be recognised—predominantly sandstone, and sandstone and shale—but it was not possible to divide them off into separate units, for the relationships to one another are not at all clear. The total thickness of the formation is probably about 1000 feet, the basal 650 feet or so of which is mainly sandstone with subordinate shales. Except where the Permian sediments are exposed below the Knocklofty Formation, the position within the sequence is often uncertain since recognisable marker horizons are usually lacking, and there has been much disturbance of the beds by the intrusion of dolerite and the Tertiary faulting. In the main the beds of the Knocklofty Formation are gently dipping (5°-15°) to the south-west but adjacent to faults and dolerite intrusions the direction and magnitude of dip varies considerably.

Wherever the base of the Knocklofty Formation is exposed, 10 to 20 feet of buff to pink conglomerate, granule conglomerate and coarse sandstone occurs. The basal 5 to 10 feet consists of poorly sorted massive conglomerate composed mainly of sub-angular to sub-rounded pebbles of vein quartz up to two inches in diameter. Commonly, bands of conglomerate a few inches thick are separated by beds about one inch thick of coarse quartz sandstone with angular particles. Above the basal conglomerate a granule conglomerate or coarse sandstone occurs, which is also poorly sorted.

Overlying the basal grits are a series of sandstones with subordinate mudstones and shales, which, at Cobb's Hill, are probably at least 650 feet thick. All the Triassic sediments of the Dromedary square are of this type, as well as those of the Pontville-Winton Hill, Shene, Tea Tree valley and Summerville areas in the Pontville square. The sandstone, which is generally yellow in colour and commonly strongly iron-stained, is medium-grained, massive and well-bedded. Usually the sediments are well sorted and composed mainly of quartz but with significant amounts of feldspar, muscovite mica and graphite. In some beds, particularly at a locality 600 yards north-east of Winton Homestead, marked heavy mineral concentrations occur in the sandstones. Sedimentary structures such as cross-bedding and slumps are very well developed in the sandstone (Plate 1, fig. 2).

Beds of conglomerate up to one inch thick are of fairly general occurrence in the sandstone. They vary from quartz conglomerates with sub-angular to sub-rounded fragments, to clay pellet conglomerates, with all gradations between. The clay pellets are usually flat ellipsoidal bodies up to three inches in diameter which are normally found parallel or sub-parallel to the bedding. In most cases the clay pellets and quartz pebbles are set in a matrix of the same composition and grain size as the surrounding sandstones. The presence of clay pellet conglomerates indicates exposure of the floor and suggests deposition in very shallow water, possibly in a lake.

The mudstones, which are massive to shaly siltstones, are in most cases subordinate to the sandstone. They are buff, purple, pink or green in colour, fine-grained and normally well sorted and almost invariably contain a considerable amount of small muscovite mica flakes. The massive siltstones normally show very fine colour banding parallel to the main bedding. These fine-grained, often laminated, sediments are particularly susceptible to erosion and normally it is only in excavations, cuttings and creek beds that they crop out. As mentioned above, the siltstones are only of a minor importance in the Dromedary square Triassic beds, but in the Pontville square they are not at all uncommon. In the area south of Jew's Hill, abundant shales are present, as revealed particularly in road cuttings, where they are interbedded with fine to medium grained, rather impure, quartz sandstones. On the northern flank of Jew's Hill practically no shale was observed, however. Although there is a fault running along the south-eastern side of this hill, its throw is considered to be only small and it downthrows to the north-east, so that the lack of shale to the north of the hill can only be explained by one, or a combination of two alternatives:

1. They do not outcrop owing to the susceptibility of the shales to erosion; or
2. A facies change occurs from south to the north from sandstone and shale into predominantly sandstone.

The first alternative is preferred, but it is possible that facies variations do play a part.

The Triassic sediments in the floor of the north-west trending Tea Tree Valley are predominantly sandstone. Outside the eastern boundary of the Pontville square, towards the head of the valley at an altitude of 700 feet plus, pink shales and buff siltstones occur with sandstone, and to the north of Maiden Early the Triassic rocks, which are almost completely surrounded by dolerite in plan, are sandstones with a high proportion of shale and siltstone above the 300 foot contour. Lewis (1946, p. 194) reports the presence of plant fragments, probably *Schizoneura* and *Johnstonia*, from this locality. It would appear in this area, therefore, that sandstone and shale overlie the sandstone. Similarly, on the eastern slopes of Elliott's Hill, sandstone and shale, as float, occur.

Wherever reasonable outcrop occurs in the Triassic sediments within the dolerite in the north-east corner of the Pontville square, abundant mudstones and shales are present, interbedded with the sandstone. The maximum thickness of sediments, which are considered to be high up in the Knocklofty Formation, is about 500 feet in this area.

At 157434 on the Tea Tree golf links, a thin sliver of "Feldspathic Sandstone" occurs adjacent to the Bagdad Fault. The rock is a medium-grained moderately well-sorted sandstone containing much feldspar in addition to quartz. Plant remains are present. Evidence from elsewhere in

Tasmania indicates that the "Feldspathic Sandstone" occurs stratigraphically above the Knocklofty Formation.

Thus, above about 20 feet of basal grits, occurs approximately 650 feet of sandstone with shale. However, within this part of the Knocklofty Formation there may be facies variations into a higher proportion of mudstone and shale. The evidence presented above suggests that higher in the sequence mudstone and shale become more abundant and that the total thickness of the formation exceeds 1000 feet in the area. The presence of the sliver of "Feldspathic Sandstone" at 157434 shows that sediments of this higher formation were deposited in the area but most of them have been removed by erosion.

JURASSIC (?) SYSTEM

Large volumes of dolerite intruded as sills, gently transgressive sheets and dykes into the Permo-Triassic rocks, brought to a close the deposition of the sediments of the Triassic System. The age of the dolerite is not known for certain, but it is considered to be Jurassic (Hills and Carey, 1949; Banks, 1952).

In general, the dolerite occurring in the area is a medium to fine grained rock with an even texture and a blue-grey colour when fresh. However, near intrusive contacts, the dolerite becomes very fine-grained, dense and flinty. A thin section (8351) cut from one such rock has an holocrystalline intergranular texture and consists of microphenocrysts of orthopyroxene set in a fine-grained base of granular and prismatic clinopyroxene and laths or anhedral crystals of plagioclase. The bulk of the dolerite is medium-grained and consists essentially of plagioclase laths (usually a labradorite), pyroxene (augite and pigeonite), with an acid mesostasis composed of quartz, plagioclase and alkali feldspar, occurring intersertally. The texture or the dolerite varies from intergranular to truly ophitic.

At one locality (020471) a coarse "pegmatitic" dolerite was found *non in situ* (specimen 8353), and it consists in the main of plagioclase laths (up to 5 mm. in size) and clinopyroxene prisms up to 2 mm. in length with an abundant quartz mesostasis. The texture is hypautomorphic granular. The rock probably originated from the dolerite magma in a late stage of its differentiation.

The dolerite has thermally altered the country rock for only a few feet in most places and generally only hardens the intruded rocks without causing much reconstitution. Thermal metamorphism of Permian sediments generally results in hard, fine-grained cherts in which little or no change in mineral composition has taken place. However, where the dolerite has intruded the Bundella Mudstone, 1000 yards south-east of the Upper Dromedary township, more marked changes have occurred. The calcareous mudstone has become blue in colour and extremely hard near the contact. In thin section (8320) a greater part of the calcite, along with a considerable proportion of the matrix has been transformed into prehnite, so that about 50% of the rock consists of this mineral, which appears to have been produced directly by the thermal metamorphism of the calcareous mudstone. The quartz, which constitutes some 35% of the rock, is fresh and occurs as sub-angular to sub-rounded grains. Its shape is very similar to that in the unmetamorphosed rock (8323). The clastic texture is still quite recognizable.

Baking of the Triassic sediments by dolerite has produced hard, white, sparkling quartzites from sandstones, and dark-blue, extremely hard and fine-grained cherty hornfelses from the quartzose mudstones.

Since the temperature of the dolerite magma was probably about 1000° C., the lack of recrystallization of the intruded sediments for any appreciable distance from the contacts is surprising. However, it is suggested that the reason the contact aureoles are so narrow is because of the absence of a catalyzing fluid being expelled from the crystallizing magma and not to a very limited supply of heat as suggested by Edwards (1942, p. 59). The metamorphism was of the true contact type, the reconstitution which has taken place being due exclusively to heat effects, and the narow aureoles are a result of the poor conductivity of the intruded sediments.

Scattered over the surface of Cornelian Hill (105498) at the north-western corner of the Pontville square, numerous boulders of chalcedony occur, including such varieties as carnelian, agate and hornstone. Layers of prismatic quartz crystals are commonly found between bands of chalcedony. This material is found very closely associated with a dolerite-Triassic sandstone contact. The author is in agreement with Nye (1922, p. 38) in concluding that it is related genetically to the intrusion. It is considered that the silica was introduced by hydrothermal solutions originating from the dolerite at a late stage during the cooling.

TERTIARY SYSTEM

The Brighton Basalts

A large flow of basalt of Tertiary age crops out over some six square miles of the Pontville and Dromedary squares. The flow, which must have been of the order of 200 feet thick, filled the pre-existing valleys of the Bagdad and Strathallern Rivulets and the Jordan River. Except where these rivers have cut down into the basalt the surface has remained practically undissected. The basalt, an olivine-bearing type, varies from a very fine grained dark rock to a medium grained rock with a doleritic texture. The Brighton Basalts will be dealt with in more detail in a separate paper.

The Mangalore Clay Deposit

Occurring above, and extending northwards from the basalt in the Bagdad Rivulet valley are a series of poorly consolidated clay and sand beds. Up to five feet of them, consisting predominantly of clay, are exposed where the rivulet has cut down through the terrace. Some of the clay appears to have been produced by weathering of basalt *in situ* but the bulk of the clay has probably been transported. The extent of the deposit has not been determined, but it is possible that the clay and sand beds are present under the extensive terrace stretching to the north in the Mangalore area. This material was probably deposited in a lake dammed behind the basalt which flowed up the Bagdad Rivulet valley.

D. P. Bahl has determined a sample of the clay by means of X-ray diffraction powder photographs and differential thermal analysis, and finds it to be a mixture of kaolinite and an abnormal montmorillonite, each making up about 40% of the sample with the remaining 20% quartz.

QUATERNARY SYSTEM

The greater part of the gravel, sand and silt deposits of the terraces, including the cover of alluvium in the present river valleys, are considered to belong to this system. On the maps, it has only been found possible to show these deposits where there is no interference with other geological boundaries. The sections through the terraces, exposed by the streams which have been incised into them, show that there is a great variation in composition. Some sections consist mainly of river gravels, covered by a thin layer of alluvium, while others have a fairly high proportion of sands, silts and clays. The river gravels are composed mainly of dolerite cobbles up to about one foot in size which are generally sub-rounded, although platy joint blocks of dolerite are not at all uncommon. The river gravel deposits have, in many cases, a well developed imbricate structure and they are generally moderately well consolidated with a matrix of sand and some finer material. Sand and silty lenses occur but in general they only constitute a small proportion of the terraces, although locally six to eight feet of them may be exposed. Extensive areas of the valley floors are covered by a thin veneer of dark-coloured alluvium deposited by the streams.

STRUCTURE

Faulting

Faulting, which is considered to be Lower Tertiary in age (Hills and Carey, 1949, p. 35), has been of considerable magnitude, particularly in the south and south-west portion of the Dromedary square. The faults are normal with the planes close to vertical, but sharp changes in their trend are not uncommon. The strike of the faults is in general north to north-west. Figure 1 is a diagrammatic map of the fault system.

The major fault of the area is the Dromedary Fault, striking in a generally north-north-west direction across the south-western portion of the Dromedary square. This fault and the faults of the adjacent horst blocks are the continuation northwards of the Cascade Fault system recognised in the Hobart area.

The Dromedary Fault upthrows to the south-west, bringing beds low in the Bundella Mudstone up against dolerite intruded into Triassic sandstones so that the throw is greater than the thickness of the Permian succession, i.e., 1500 feet +.

Further east in the Cobb's Hill horst there is at least 600 feet of Triassic strata above the Ferntree Mudstone without dolerite intruded into it, so that the throw on the Dromedary Fault is probably 2200 feet or more. Along the fault from 027437 in a north-westerly direction the throw decreases and, because dolerite becomes transgressive down into Ferntree Mudstone the fault becomes difficult to trace into the adjacent square, Black Hills. Furthermore, the main fault divides up into several smaller faults, all still with the same sense of movement. The physiographic expression of the fault is a series of gullies and saddles which can readily be traced on the aerial photographs. As mentioned previously, the downthrown block is

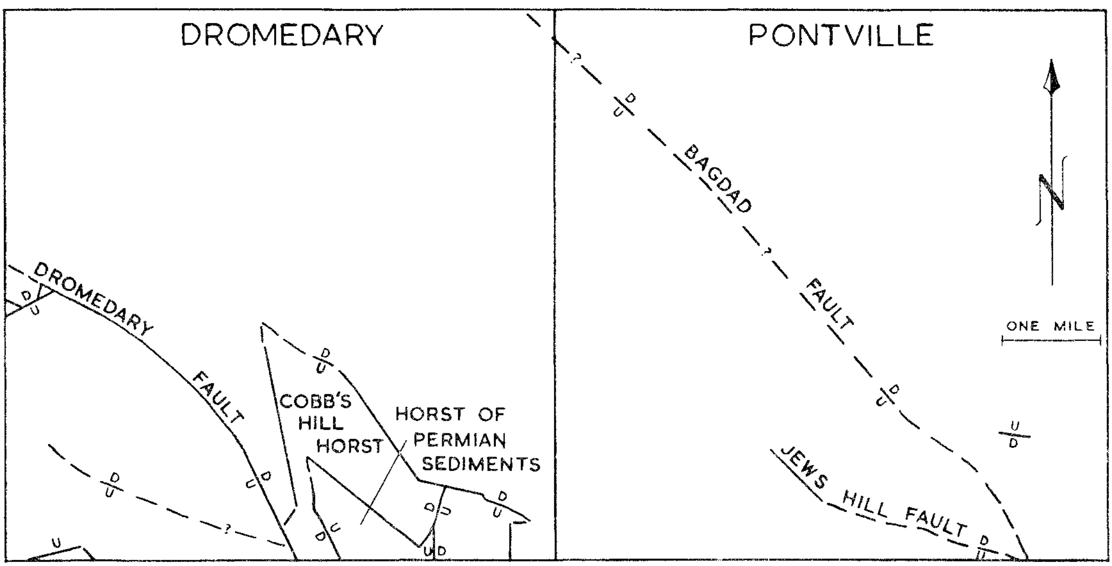

FIG. 1.—Diagrammatic map of the fault system of the Dromedary-Pontville area.

tilted towards the fault plane producing a fault angle depression—a common feature of tension faulting, and this may be caused by the fault plane becoming less steep at depth. Within the upthrown Dromedary block several faults of a throw of about 100 feet have been recognised. In general, they strike in towards the Dromedary Fault. At 010401 in a road on the line of one such fault, a very hard fault breccia some sixteen yards in width is exposed. This consists of strongly angular Permian mudstone fragments up to several inches in size.

There are two horsts in the south-eastern portion of the Dromedary square. The larger one, the Cobb's Hill horst, consists of Triassic sediments, which have been upfaulted, as indicated by drag dips, into dolerite intrusive into the Knocklofty Formation. At Cobb's Hill basal Triassic grits occur at 077404 with some 600 feet of sandstone (and some shale) above them. There is no sign of dolerite in the section, so that the dolerite intrusive into the Knocklofty Formation north of the horst fault is most probably in horizons at least 650 feet above the base of the Triassic sediments. The horst fault therefore has a throw of at least 650 feet and it could be as much as 900 feet. The western boundary fault of the horst joins up with the Dromedary Fault resulting in a decrease in throw along this fault of the order of 900 feet.

The second horst, consisting of Permian sediments, occurs within the Cobb's Hill horst and it is remarkable that the shape of this block is very similar to that of the surrounding horst. At 075403 the throw of the boundary fault is about 900 feet and this throw possibly remains constant. The faults of this block disappear into the Derwent River to the south. From 078405 to 080444 a fault with a north-north-east trend joins the two systems of horst faults resulting in Ferntree Mudstone being upthrown against Knocklofty Formation on the west and dolerite on the north and east. The throw is probably about 500 feet.

At 048434 a floater of hard white quartzite was found near the Knocklofty Formation-dolerite boundary, suggesting the possibility of an intrusive contact. However, no other definite contact effects were observed and the boundary is most probably a Tertiary fault, as has been assumed above, the quartzite having been brought up by the faulting from an intrusive contact below.

The Jews Hill Fault strikes in a generally west-north-west direction along the south-western flank of the hill and the drag dips on the Triassic sandstones and shales indicate that the south-west side is upthrown. The throw on the fault at a minimum is 150 feet, but it is probably somewhat greater than this. The dolerite overlying the sediments on the upthrown side has been removed by erosion. The fault can be traced with minor inflexions in an east-south-easterly direction at least as far as the southern boundary of the Pontville square, but it cannot be found extending towards Brighton from the western slopes of Jew's Hill.

The dolerite-Knocklofty Formation boundary trending north-west along the western side of Thompson's Hill appears to be a fault—called here the Bagdad Fault. At 153436, in a cutting on the Tea Tree road, sandstones which have a dip of 20° to the north-east are exposed and this has been interpreted as drag dip on a fault with the east side downthrown. At the top of Thompson's Hill several feet of white, glassy quartzite occurs overlying the dolerite, and it is suggested that this is a remnant of the roof rocks of the Jews Hill intrusion, which has been faulted down to its present position. Nevertheless it is possible that the quartzite may have been a small raft of sediment floating within the dolerite. On the hypothesis that the baked sediment is in fact a portion of the roof rocks of the Jews Hill body, a throw on the fault of some 800 to 1000 feet is required, downthrowing to the east. In a trench (157434) on the line of the postulated fault a thin sliver of "Feldspathic Sandstone" occurs. Its boundary with the dolerite is much shattered and there is much lime present. All these facts taken together suggest the existence of a fault. Lewis (1946, p. 185) interprets the dolerite-Triassic contact at Thompson's Hill as intrusive because of the strong baking along the dolerite-sediment contact running south from 168423; this point lying on the fault. However, on p. 196 Lewis states that at the Tea Tree golf links, near the Tea Tree road, the contact appears to be faulted.

It is significant that the axis of the pre-basaltic valley and also of the present-day valley is a continuation of the Bagdad Fault. Between the Wybra Hall Permian rocks and the Triassic sediments at Shene the fault explains the lack of stratigraphical rank across the valley; however, the extension of this fault further north is somewhat doubtful. It could cut across the extreme north-eastern corner of the Dromedary square, dropping the Knocklofty Formation down to dolerite, which further south is intruded into Ferntree Mudstone, but there is some doubt since several blocks of thermally metamorphosed sandstone were observed near the boundary, suggesting rather that the contact is an intrusive one.

The relatively high country rising westwards from the main Hobart-Launceston Highway from Pontville north must be considered, therefore, as a dissected, retreated fault scarp with the Bagdad Rivulet formed in the fault angle; the highlands rising to the east possibly being the result of tilt of the downthrown block in towards the fault. The Bagdad Fault could be continued southwards approximately along the axis of the Back Tea Tree Valley, but dolerite occurs both east and west of the proposed line so that there is no proof for its existence in this area.

A fault with a throw of the order of 100 feet was recognised at 185423, south of Elliott's Hill, striking just north of west. The Triassic sandstones have a strong dip (40°) to the south, indicating that the northern side is upthrown. The displacement of the dolerite contact westwards on the upthrown side of the fault supports the view that the floor of the intrusion dips towards the west.

At 027461 the reversals of dip and the relatively high angles of dip recorded in the Triassic sandstones probably indicate a fault passing through

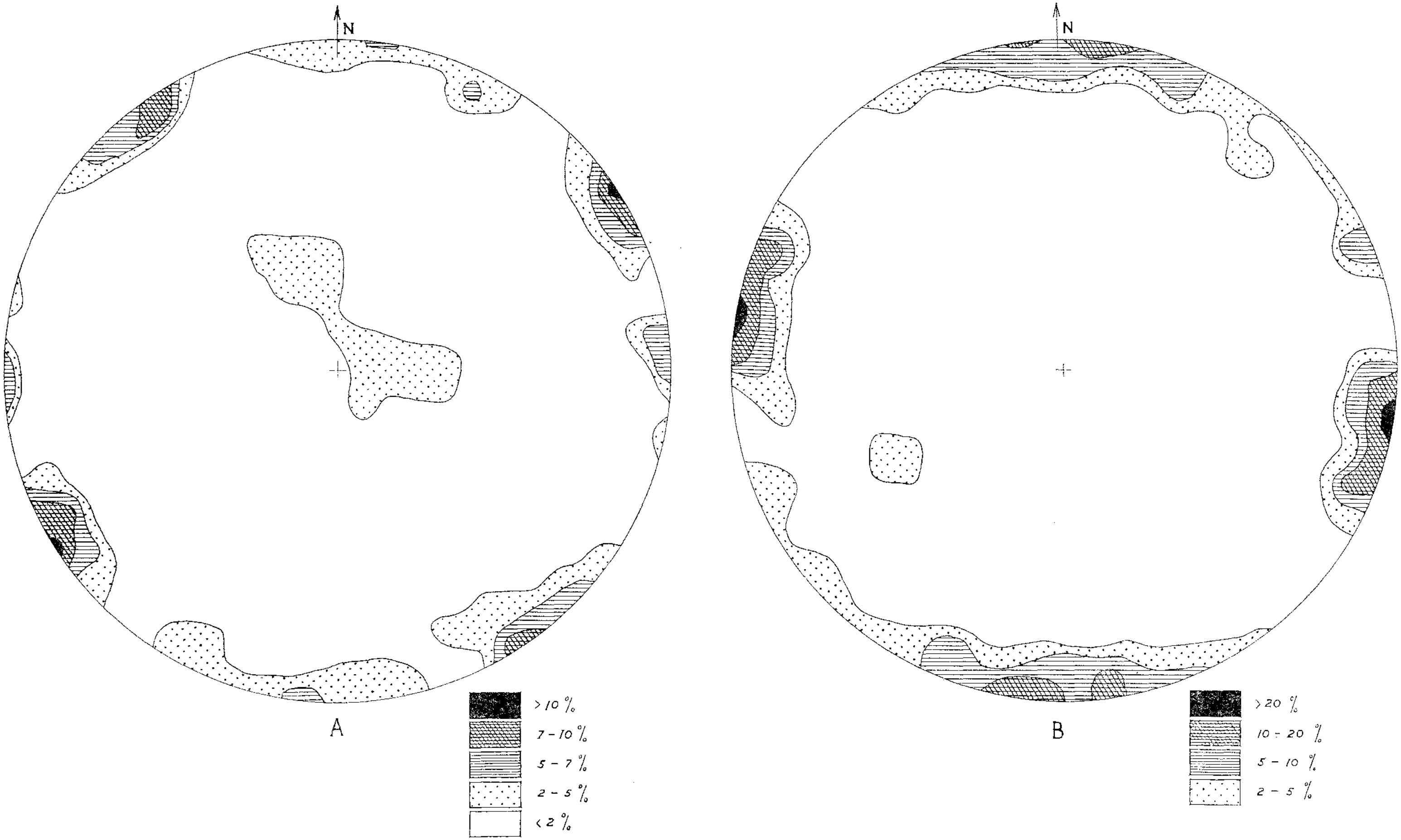

FIG. 2.—A. Contoured stereographic projection of the poles to 70 joint planes in dolerite.
B. Similar pojection for poles to 45 joint planes in sediments.

the area, but it was impossible to obtain a consistent picture of the movement from the dips nor could a fault be traced in the area.

Jointing of the Dolerite

Jointing is very well developed in much of the dolerite and up to five different directions have been observed in the one exposure. In many outcrops there is a predominant series of joint planes, which, in general, are sub-vertical and closely spaced so that thin plates an inch or so in thickness are frequently found. Columnar jointing is rarely developed. In some places it has been observed that the strike of one joint system approximates to the trend of the dolerite-sediment contact, but this is by no means apparent everywhere.

The poles to seventy joint planes in the dolerite were plotted on a stereogram (Fig. 2*a*) which was then contoured. A maximum of 10% occurs in a direction of 55°, corresponding to a set of vertical joints striking at 325°, and at right angles to this a 7% maximum occurs corresponding to vertical joints striking at 55°. Sub-maxima (5%) occur in an east-west and north-south direction representing vertical joints striking north-south and east-west respectively. Sub-horizontal joints are not uncommon, as shown by the presence of a 2 to 5% area towards the centre of the diagram.

Both the trend of the Tertiary faults and the strike of the most strongly developed system of joints is the same. The other main set of joints is at right angles to the trend of the faults. The coincidence of direction may be purely fortuitous, or the two prominent sets of joints may be related to the tensional forces which produced the faults or it might even be possible that the Tertiary faults were controlled by the joint directions in the dolerite.

If the joints in the dolerite were produced at the same time as the Tertiary faulting, it might be expected that the sediments also would show such joints. A contoured stereographic projection of the poles to the joint surfaces, mainly in Permian rocks, was prepared (Fig. 2*b*) and two good maxima occur at 100° and 10°, corresponding to two sets of vertical joints striking at 10° and 100° respectively. Although only 45 readings were obtained, the maximum of nearly 25% is probably significant. These two directions do not correspond to those in the dolerite nor to the general trend of the Tertiary faults.

THE FORM OF THE DOLERITE INTRUSIONS

Dolerite occupies more than a third of the area and, except within the horsts and the Dromedary fault block, the hills are almost invariably capped by dolerite. It is intrusive into both Permian and Triassic sediments, but by far the greater volume is found in the latter beds in this area. The form of intrusion is extremely variable, from concordant or slightly transgressive sheets to strongly transgressive dyke-like bodies. Sill-like bodies of dolerite are most common, although in detail the contacts are in many cases discordant. The thicknesses of the sills are usually impossible to determine since the sedimentary roof rocks of the intrusions have generally been removed, but in most cases at least 500 feet of dolerite is exposed, and at Mt. Dromedary there appears to be about 1000 feet.

The large mass of dolerite extending north of Strathallie Hill has strongly discordant contacts with the country rocks. Along the southern side of Strathallie Hill a sliver of much shattered and strongly thermally metamorphosed Ferntree Mudstone up to 200 yards wide and one mile long crops out at a higher altitude than adjacent Triassic sediments. It is interpreted as being due to dragging up along the dolerite contact by the forcible intrusion of the dolerite. This, along with the roughly-concentric pattern of joints, one of which the Jordan River follows for some distance, suggests the possibility of a centre of intrusion in this area.

Eastwards from this centre a sill-like body of dolerite was intruded into the Ferntree Mudstone and the lower beds of the Knocklofty Formation, lifting the large block of Mangalore sediments above it. The dolerite is generally concordant but in local areas it is slightly transgressive, since it rises stratigraphically towards the north through the Ferntree Mudstone into the basal beds of the Knocklofty Formation. North of the Mangalore Creek, near the northern boundary of the Dromedary square, two blocks of Ferntree Mudstone occur floating as rafts in the dolerite, and these are probably remnants of the sedimentary cover of the intrusion, separated from the main body of roof rocks by dykes of dolerite.

The block of Ferntree Mudstone half a mile long and up to three hundred yards wide cropping out half a mile north of the turn-off to Mangalore on the Broadmarsh road, is also a portion of the roof rocks overlying the dolerite. Towards the east the dolerite invaded lower in the Ferntree Mudstone till near the base of the latter it became dyke-like, the contact running in a straight line down through the "Woodbridge Glacial Formation," north of Wybra Hall, to be cut off by the inferred Bagdad Fault from the Triassic sediments further east. North and north-west of the Mangalore Creek Valley the hills, which consist of dolerite, rise rather steeply to about 1000 feet so that the lack of sediments above the dolerite here indicates that it became more transgressive northwards.

Dolerite connected with the Strathallie Hill intrusion and the sill underlying the Mangalore Creek sediments rose up through an east-west fracture into the Knocklofty Formation, where it spread southwards as a sill. The dyke-like contact runs along the northern flank of the Winton Hill-Goat Hill ridge, which consists of the eroded dolerite sill. The Mangalore Creek sediments are therefore in a large block (four miles long and averaging one mile in width), isolated from the sedimentary basement by dolerite. Lewis (1946, p. 191) explained the occurrence of the Mangalore Permo-Triassic block as being due to faulting along east-west lines before the intrusion of the dolerite, but this is incorrect—the faulting was cognate with the intrusion. On the southern slopes of Winton Hill the dolerite becomes transgressive down through the Triassic beds.

In the extreme north-eastern corner of the Dromedary square the dolerite is possibly faulted up against Triassic sediments along the postulated Bagdad Fault, but the presence of some quartzite suggests that the boundary is in fact intrusive. If the contact is an intrusive one the dolerite would have to be strongly transgressive upwards, since the field relations indicate that the Triassic beds would have to constitute the floor of the intrusion.

The dolerite extending from Lodge Hill westwards to the western edge of the Dromedary square is considered to be the southern continuation of the Goat Hill-Winton Hill sill, the Jordan River having cut down through it to reveal the underlying Knocklofty Formation. The dolerite remains sill-like for the most part, except in the area between the Broadmarsh road, south-west of the Mangalore turn-off, and the Dromedary Fault where the dolerite has discordant contacts with the intruded sediments. This dolerite sill is faulted off on the south and south-west by the Dromedary Fault and the Cobb's Hill horst faults. An irregularly-shaped block of Triassic sandstone and shale, completely surrounded by dolerite, except on one side which is faulted off by the Dromedary Fault, occurs in the area around 040435. The contacts are discordant and the sediments are strongly thermally metamorphosed. It is uncertain whether this block is a raft of sediment in the dolerite or is connected with the country rock below the dolerite. A similar type of occurrence is found at 087412.

The small dolerite body at Brighton and the two masses south, on the eastern side of the River Jordan, are considered to be extensions of the Lodge Hill dolerite.

The dolerite capping Mt. Dromedary was intruded at least 400 feet above the base of the Triassic beds which, at 007404 on the south-eastern slopes of the mountain, is at an altitude of 1830 feet. The dolerite intrusion appears to be a flatlying sill so that its exposed thickness is of the order of 1000 feet, since the altitude of Mt. Dromedary is 3245 feet. It is considered to be the same sill as that exposed in the downthrown side of the Dromedary Fault. Within the Dromedary block dolerite has also been intruded, as a sill, 100 to 250 feet below the top of the Bundella Mudstone. Since dolerite occurs in the lower Permian sediments immediately adjacent to the Dromedary Fault and also in the downthrown block right up to the fault plane, intruded into Triassic strata, then there are at least two bodies of dolerite at different stratigraphic horizons in this part of the area.

In the north-western corner of the Dromedary block dolerite has been intruded into Ferntree Mudstone; three of the four boundaries are Tertiary faults but the fourth is a dyke-like dolerite chilled contact.

West of the Strathallie Hill intrusion and divided from it by the Broadmarsh Valley in sandstone is an arrowhead-shaped, dyke-like intrusion of dolerite which may be an extension of the Strathallie Hill body from depth. It is definitely connected with large intrusions to the north and west.

Jews Hill consists of a sill of dolerite intruded into Triassic sediments and it has a fault running along its southern flank. The northern boundary is approximately concordant, but the base of the dolerite rises eastwards from 250 feet on the western side of the hill to about 680 feet at 165418, east of which it decreases by 200 feet in 500 yards. The dolerite, becoming strongly transgressive, swings north to meet the Bagdad Fault 400 yards south of Thompson's Hill. At least 600 feet of dolerite is exposed on Jews Hill. The Thompson's Hill-Elliott's Hill intrusion is considered to be the same sill faulted down some 800 feet by the Bagdad Fault with the baked Triassic sandstone on top of Thompson's Hill possibly a remnant of the roof sediments; however, the quartzite here could well be a small raft in the dolerite. The base of the sill is exposed on the eastern slopes of Elliott's Hill and strikes in a south-easterly direction. The contact is in general concordant but, northwards from 181428, it is dyke-like.

The three-quarter mile wide Tea Tree Valley, eroded in sandstone, separates the Elliott's Hill dolerite from another intrusion, which has the same general trend and which is part of the large mass of dolerite in the north-eastern portion of the square. This large and extensive intrusion of dolerite remains in the Knocklofty Formation, but becomes higher stratigraphically towards the north-east. There are many blocks of sediment which, in plan, are completely surrounded by dolerite; their diameters range from 100 yards to half a mile. In many cases these appear to be rafts of sediment, floating in the dolerite, which were torn off from the country rocks by the invading magma.

South-east of Tea Tree the dolerite contact with the country rocks is steeply dipping, but north of Tea Tree it becomes concordant, with the dolerite overlying the sediments. Dolerite extends eastwards to the edge of the square from this contact probably in the form of a flat dipping sheet. North of Maiden Early the dolerite remains concordant, except in the area around 158468, where it becomes strongly transgressive. The south-west striking spur of dolerite north-west of Maiden Early is probably continuous with that extending north from Thompson's and Elliott's Hills under the basalt. The contact with the Knocklofty Formation on the northern side of the spur rises gently towards the north-east and then swings to the north-west, striking in this direction to the boundary of the Pontville square. The steep dips to the south-west (e.g., 52° at 120497) and the strong thermal metamorphism suggests a transgressive body rising to the north-east, but whether this discordance continues to any great depth is uncertain.

A large intrusion of dolerite occurs in the north-east corner of the Pontville square. This contains large blocks of Triassic sediment and these are probably the key to the form of the intrusion, but several interpretations are possible. If the base of the dolerite rises towards the north-east then these blocks could be part of the sedimentary floor exposed by erosion. The base of the dolerite one mile north-east of Shene is at about 350 feet, but the Triassic-dolerite contact one mile further north-east at 163495 is at 1400 feet so that a gradient of one in four is required on the base of the dolerite for it to reach this height. However, the contact 500 yards north of Sheehan's Hill is only at about 970 feet so that a gradient of only one in seven is necessary here. Since the dolerite nearly surrounds the blocks of Triassic sediments the base of the dolerite would have to be very irregular to explain the field data by this form of intrusion. By means of faults, one along each of the two creeks which join one mile north of Merriworth, it is possible to explain the presence of Triassic rocks on the western slopes of both valleys, but since no major fault is present further south the throws on the two faults would have to decrease southwards. The sum of the throws (which are in the same sense) must be only several hundred feet where the two faults meet. The Mt. Dismal block between the two postulated faults would have to be tilted towards the south-west to produce such a system of faults and there would have also to have been several hundred feet of downward movement of the eastern block at the edge of the square with respect to the dolerite in the Sheehan's Hill area. The large blocks of Triassic sediments are still not adequately explained by this hypothesis.

A single sill-like body, which has not been faulted at a later time and which, during its intrusion, detached blocks of sediment from the country rock so that they remained floating in the dolerite, may possibly explain the field facts. But many intrusions of dolerite are found free of such rafts of sediment so that if this interpretation is correct there must be some controlling factor on this intrustion which is not normally operative. S. W. Carey (personal communication) suggested that if dolerite magma from two different centres of intrusion were to interfinger, then an outcrop pattern as found in this area may result. Blocks of sediment would be isolated from the country rock in such a zone of interfingering. This last hypothesis, at the present time, appears the most reasonable interpretation, but it is considered that the relationships between the dolerite and the intruded sediments, in this part of the area, will only become clear when further detailed mapping is carried out in adjacent areas.

A small oval-shaped intrusion of dolerite, 300 yards by 200 yards, occurs 200 yards south-east of the junction of the Bagdad Rivulet with the Jordan River. It is a plug-like mass which is, however, conformable for a short distance on its eastern margin.

SUMMARY

A sequence of over 1500 feet of mainly marine sandstones, mudstones, siltstones and limestones was deposited during Permian times followed disconformably by at least 1000 feet of Triassic terrestrial sandstones and shales. In the Jurassic (?) Period there were great intrusions of dolerite into the Permian and Triassic sediments in the form of dykes, slightly transgressive sheets and sills. Strong Tertiary faulting affected the area, particularly in the south-western portion of it, and this, along with the distribution of rock types, has been a controlling factor in the formation of the present-day physiography. Basalt, probably of Upper Tertiary age, partly filled the valleys of the Jordan River and its tributaries.

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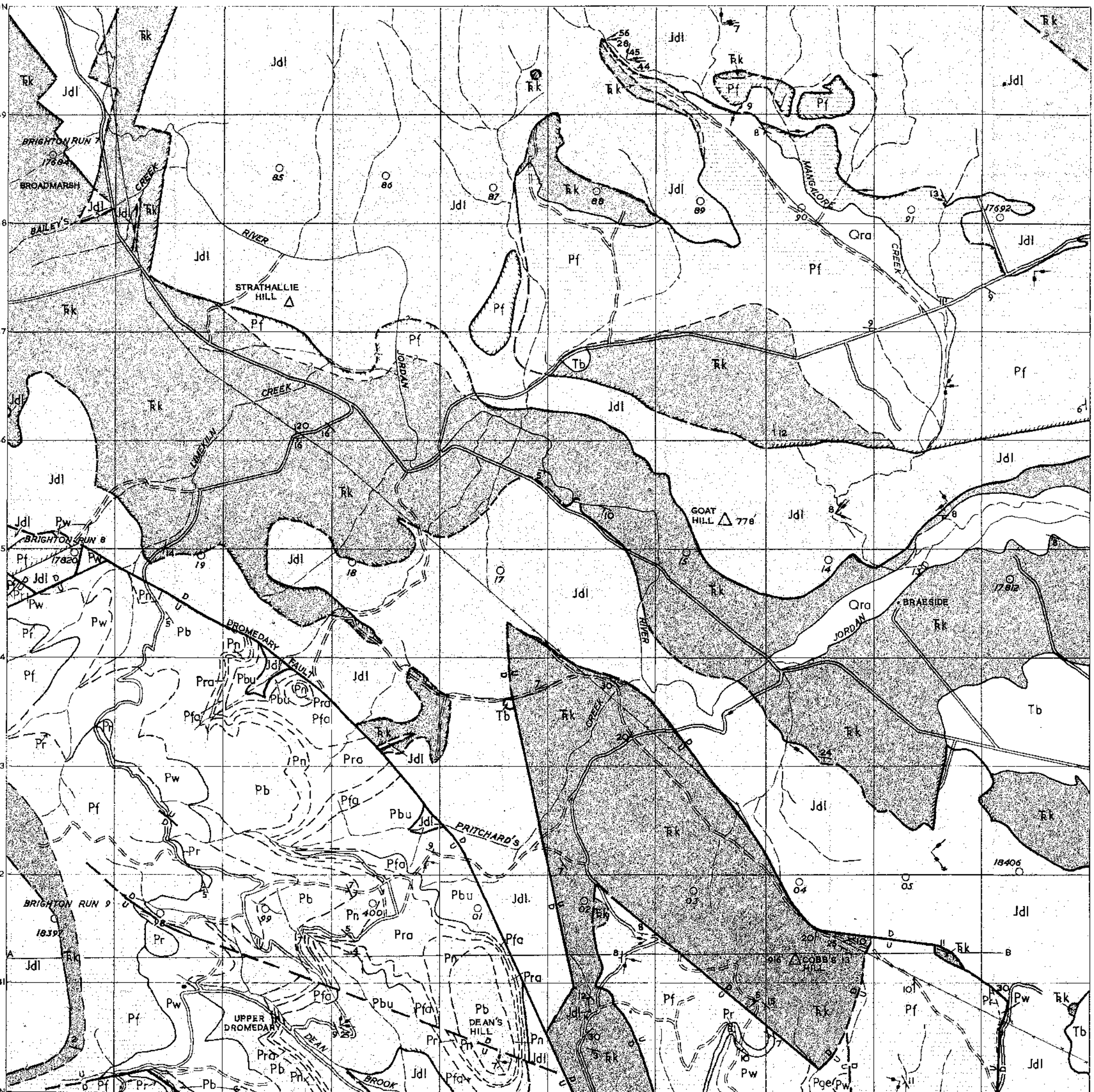
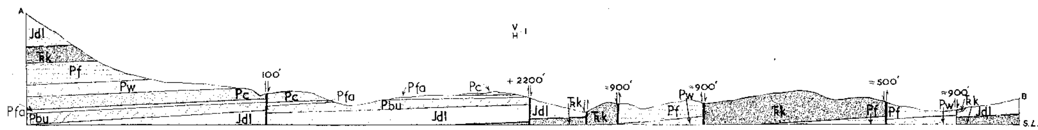
PLATE 1.

FIG. 1.—Typical outcrop of massive Risdon Sandstone on the Upper Dromedary road.
FIG. 2.—Triassic quartz sandstone showing well-developed current bedding and slump structures.

DROMEDARY





LEGEND

FAULT WITH DOWNTHROWN SIDE INDICATED (U/D)	
FAULT – POSITION APPROXIMATE	
FAULT INFERRED	
FORMATION BOUNDARY	
FORMATION BOUNDARY – POSITION APPROXIMATE	
Dolerite Boundaries	
CONCORDANT SILL	
DISCORDANT INTRUSIVE BOUNDARIES	
VERTICAL JOINTS	
STRIKE AND DIP OF JOINTS	
STRIKE AND DIP OF STRATA	
ROAD	
RAILWAY LINE	
VEHICULAR TRACK	
TRANSMISSION LINE	

Quaternary System
RECENT SERIES
- Qra — ALLUVIUM

Triassic System
- Ŧk — KNOCKLOFTY FORMATION

Permian System
- Pf — FERNTREE MUDSTONE
- Pr — RISDON SANDSTONE
- Pw — WOODBRIDGE GLACIAL FORMATION
- Pge — GRANGE MUDSTONE
- Pb — BERRIEDALE LIMESTONE
- Pn — NASSAU SILTSTONE
- Pra — RAYNER SANDSTONE
- Pfa — FAULKNER GROUP
- Pbu — BUNDELLA MUDSTONE

CASCADES GROUP (Pc)

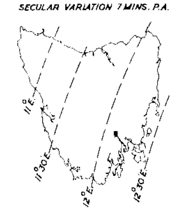
IGNEOUS ROCKS

Tertiary System
- Tb — BASALT

Jurassic(?) System
- Jdl — DOLERITE

Compilation from Aerial Photographs. Trigonometric Station Control by courtesy of the Department of Lands and Surveys Hobart and the Australian Army Survey Service. Origin of co-ordinates 400,000 yds. West and 1,800,000 yds. South of the True Origin of Zone 7 of the International Grid.

KEY MAP SHOWING MAGNETIC DECLINATIONS
SECULAR VARIATION 7 MINS. P.A.



MAPPED AND COMPILED BY I. McDOUGALL 1956

SCALE

0 — 1 — 2 MILES

0 1 2 3 4 5,000 10,000 FEET

GEOLOGY OF THE DROMEDARY AREA
SHEET 5074

PHYSIOGRAPHY

The area has in general a relief of about 800′, with rounded, but commonly steep-sided, hills rising up from relatively broad valleys. The physiography has been controlled mainly by the Tertiary faulting striking in a north-westerly direction. The Dromedary Fault is the major fracture and has a throw of 2,000 feet or more decreasing in magnitude to the north-west. On the upthrown (south-west) side of this fault the relief is in excess of 2,000′. In the downthrown block, which was tilted towards the fault plane, the main drainage of the area takes place parallel to the fault with small consequent streams flowing in at approximately right angles from both blocks. The distribution of the resistant dolerite and the relatively soft sediments has also been an important factor in controlling the physiography. The Jordan River north of Strathallie Hill, has cut a steep-sided valley and appears to follow major joints within the dyke-like intrusion of dolerite.

STRUCTURAL GEOLOGY

The major structural features are the Tertiary faults. Apart from the large Dromedary Fault two horsts occur within the southern part of the area with the larger Cobb's Hill horst of Triassic sediments having a throw of the order of 900′, and the inner, smaller horst, consisting of Permian sediments, having a throw of similar magnitude.

STRATIGRAPHIC TABLE

Age	Group	Formation	Lithology	Thickness (in feet)
Quaternary			River gravels and alluvium	
Tertiary		Brighton Basalt	Olivine basalt flow	100
			Basanite plugs	
Early Tertiary (?)			Strong Faulting	
Jurassic (?)			Tholeiitic dolerite sills and dykes	
Triassic		Knocklofty Sandstone and Shale	Predominantly quartz sandstone, some shale. Basal conglomerates and granule conglomerates.	650
Permian		Ferntree Mudstone	Mudstone	620
		Risdon Sandstone	Sandstone, conglomeratic bands	20
		"Woodbridge Glacial Formation"	Siltstones and fine sandstones—Basal coarse sandstone	260
	Cascades	Grange Mudstone	Mudstone	**100-0**
	Cascades	Berriedale Limestone	Limestone, minor calcareous mudstone	150-250
	Cascades	Nassau Siltstone	Siltstone	60
	Faulkner	Rayner Sandstone	Sandstone and Siltstone	35
	Faulkner		Sandstone and Siltstone	40
	Faulkner	Bundella Mudstone	Sandstones, siltstones, mudstones	250+

IGNEOUS ROCKS

In the Jurassic (?) Period there was widespread injection by tholeiitic dolerite magma into the Permo-Triassic sediments as large, commonly irregular, sill-like and dyke-like bodies. The sills in most cases have been unroofed by erosion. Over 1,000 feet of dolerite is exposed in a sill capping Mt. Dromedary in the south-west corner of the area.

There are two occurrences of basanite in the form of plugs and these are considered to be Tertiary in age. A flow of olivine basalt of Tertiary age fills portion of the pre-basaltic Jordan valley.

POINTS OF SPECIAL INTEREST

Basanite plug (5053E 7468N).
Horst fault (5060E 7415N).
Dromedary Fault (5047E 7413N).
Fault breccia (5010E 7402N).
Steep intrusive contact of dolerite with sediments (5050E 7466N).
Basal Triassic grits (5070E 7472N).
Risdon Sandstone (5067E 7405N).

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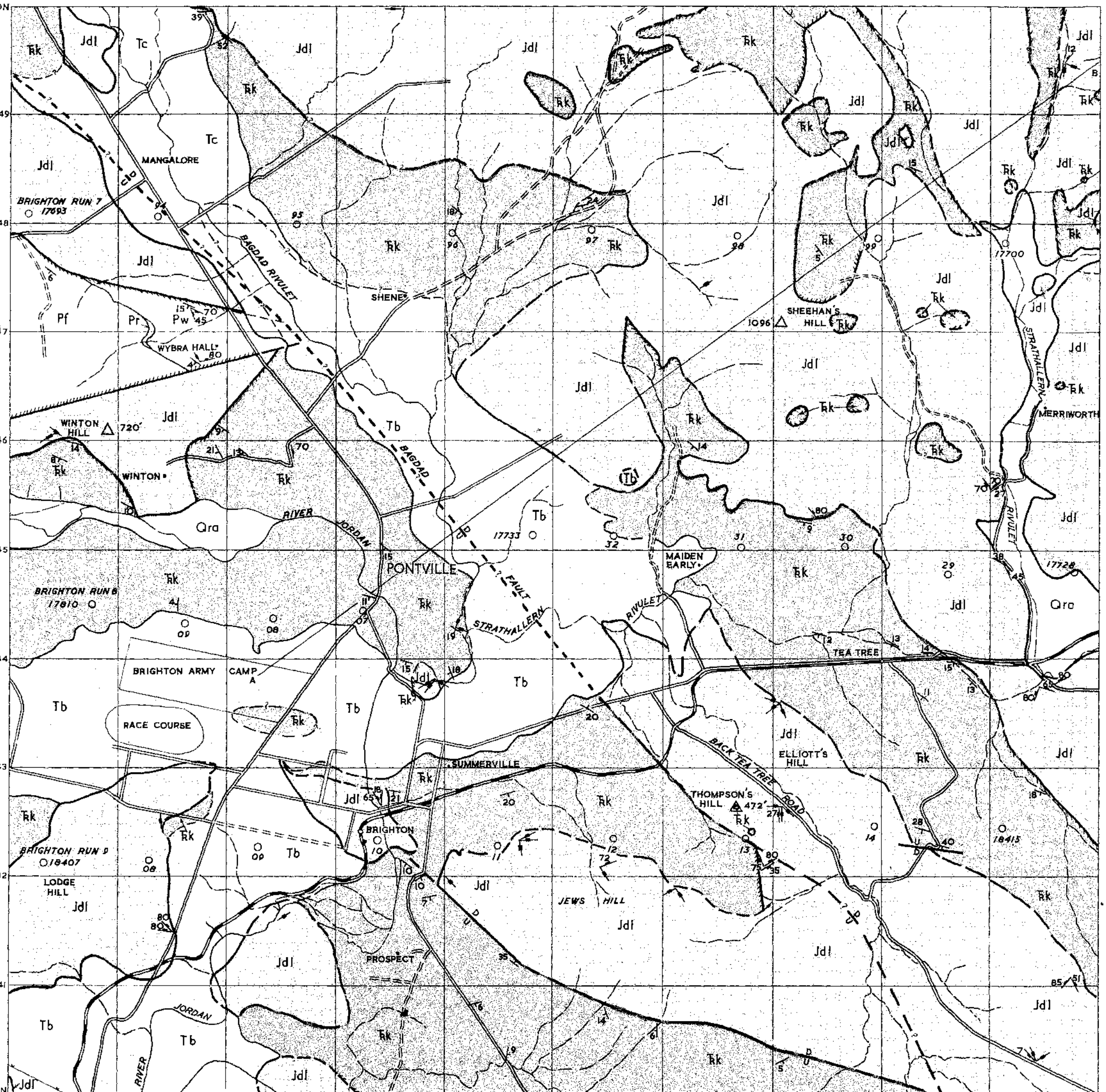
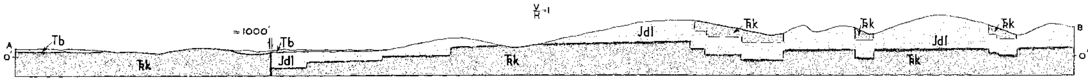
PONTVILLE

ONE INCH SERIES—UNIVERSITY OF TASMANIA, GEOLOGY DEPARTMENT





LEGEND

- FAULT WITH DOWNTHROWN SIDE INDICATED
- FAULT CONCEALED
- FAULT INFERRED
- FORMATION BOUNDARY
- FORMATION BOUNDARY - POSITION APPROXIMATE

Dolerite Boundaries

- CONCORDANT SILL
- DISCORDANT INTRUSIVE BOUNDARIES
- VERTICAL JOINTS
- STRIKE AND DIP OF JOINTS
- STRIKE AND DIP OF STRATA
- ROAD
- RAILWAY LINE
- VEHICULAR TRACK
- TRANSMISSION LINE

Quaternary System
RECENT SERIES

- Qra — ALLUVIUM

Tertiary System

- Tc — CLAYS AND SANDS

Triassic System

- Tk — KNOCKLOFTY FORMATION

Permian System

- Pf — FERNTREE MUDSTONE
- Pr — RISDON SANDSTONE
- Pw — WOODBRIDGE GLACIAL FORMATION

IGNEOUS ROCKS
Tertiary System

- Tb — BASALT

Jurassic ? System

- Jdl — DOLERITE

Compilation from Aerial Photographs. Trigonometric Station Control by courtesy of the Department of Lands and Surveys, Hobart, and the Australian Army Survey Service. Origin of co-ordinates 400,000 yds. West and 1,800,000 yds. South of True Origin of Zone 7 of the International Grid.

MAPPED AND COMPILED BY I. McDOUGALL 1956

KEY MAP SHOWING MAGNETIC DECLINATIONS 1957
SECULAR VARIATION 1' PER ANNUM

SCALE
0 — 2 MILES
0 1 2 3 4 5,000 — 10,000 FEET

GEOLOGY OF THE PONTVILLE AREA
SHEET 5174

PHYSIOGRAPHY

Rounded but steep-sided hills, usually composed of dolerite, rise up to some 800' above the broad open valleys which are generally eroded in the relatively soft Triassic sediments. Faulting has also been a controlling factor, particularly the Bagdad Fault, which the Bagdad Rivulet follows for some distance. Commonly dolerite and basalt act as local base levels for the streams because of their resistance to erosion. Above these bars the drainage system has sediments as bed rock and wide valleys have been eroded in which the gradient of the streams is low. Within the basalt and dolerite the rivers have developed gorges.

The surface of the basalt, except where the streams breach it, is markedly planar.

STRUCTURAL GEOLOGY

The Bagdad Fault is the main structural feature of the area and has an estimated throw of about 800', downthrowing to the north-east. The south side of Jew's Hill is also faulted, with a minimum throw of 150'.

STRATIGRAPHIC TABLE

Age	Formation	Lithology	Thickness (in feet)
Quaternary		Alluvium and river gravels	
Tertiary	Mangalore	Clay and sand	5 +
	Brighton Basalt	Olivine basalt flow	150 +
		Plug of olivine basalt	
Early Tertiary (?)	**Strong Faulting**		
Jurassic (?)		Tholeiitic dolerite sills and dykes	
Triassic	Knocklofty Sandstone and Shale	Sandstones and shales	1000 +
Permian	Ferntree Mudstone	Mudstone	200 +
	Risdon Sandstone	Sandstone	20
	"Woodbridge Glacial Formation"	Siltstones and fine sandstones	250

IGNEOUS ROCKS

Jurassic (?) dolerite was intruded as rather irregular sheet-like and dyke-like bodies. Almost invariably the sedimentary roof rocks of the intrusions have been removed by erosion along with some of the dolerite, so that the maximum thickness remaining in a sill-like body is about 800 feet. The complex outcrop pattern of dolerite and sediment in the north-eastern part of the area is possibly due to the interfingering of two sheets of dolerite originating from different centres of irruption.

The Brighton Basalt of Tertiary age has flowed down the pre-existing Jordan valley, flooding back up the valleys of the Bagdad and Strathallarn Rivulets. Only one flow is present which in the south exceeds 150 feet in thickness. The basalt is a massive to vesicular and amygdaloidal, olivine-bearing type normatively saturated in silica. Depending on the position within the flow the texture varies from porphyritic with a glassy groundmass to typically ophitic. Polygonal joint columns are usually developed and in some cases groups of such columns present most extraordinary forms, varying from fan-shaped groups to "synclines" up to 120 yards across.

A plug of olivine basalt, probably also of Tertiary age, occurs north-west of Maiden Early.

POINTS OF SPECIAL INTEREST

"Syncline" of basalt columns (5115E 7400N).
Fan shaped group of basalt columns (5135E 7438N).
Section through basalt flow showing the strong textural variation (5142E 7438N).
Intrusive contact of dolerite with sandstone (5139E 7438N).
Triassic sandstones showing current bedding (5187E 7439N) and slump structures (5133E 7446N).

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